SHARP

SUPPLEMENTAL SERVICE MANUAL

S22M183R509FE

R-509FW

MICROWAVE OVEN

MODEL R-509FW

This is a supplemental Service Manual for Microwave Oven model R-509FW. This model is quite similar to the base models; R-510FK/FW (S12M182R510FE).

This supplemental manual must be used in conjunction with the base model service manual for complete operation, service, safety and replacement parts information.

In the interest of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

WARNING TO SERVICE PERSONNEL: Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts may result in a severe, possibly fatal, electrical shock. (High Voltage Capacitor, High Voltage Power Transformer, Magnetron, High Voltage Rectifier Assembly, High Voltage Harness etc..)

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SHARP ELECTRONICS CORPORATION

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The contents are subject to change without notice.

Service Headquarters: Sharp Plaza, Mahwah, New Jersey, 07430-2135

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.
(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary: (1) interlock operation, (2) proper door closing, (3) seal and sealing surfaces (arcing, wear, and other damage), (4) damage to or loosening of hinges and latches, (5) evidence of dropping or abuse.
(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity, and connections.
(d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
(e) A microwave leakage check to verify compliance with the Federal Performance Standard should be performed on each oven prior to release to the owner.

BEFORE SERVICING

Before servicing an operative unit, perform a microwave emission check as per the Microwave Measurement Procedure outlined in this service manual.
If microwave emissions level is in excess of the specified limit, contact SHARP ELECTRONICS CORPORATION immediately @1-800-237-4277.

If the unit operates with the door open, service person should 1) tell the user not to operate the oven and 2) contact SHARP ELECTRONICS CORPORATION and Food and Drug Administration's Center for Devices and Radiological Health immediately.

Service personnel should inform SHARP ELECTRONICS CORPORATION of any certified unit found with emissions in excess of 4mW/cm^2. The owner of the unit should be instructed not to use the unit until the oven has been brought into compliance.

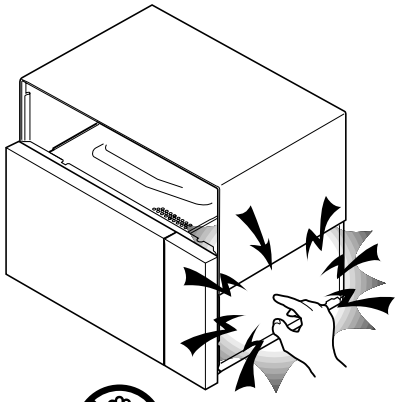
WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts may result in a severe, possibly fatal, electrical shock.

(Example)

High Voltage Capacitor, High Voltage Power Transformer, Magnetron, High Voltage Rectifier Assembly, High Voltage Harness etc..

Read the Service Manual carefully and follow all instructions.



Don't Touch !
Danger High Voltage

Before Servicing

1. Disconnect the power supply cord , and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.

WARNING: RISK OF ELECTRIC SHOCK. DISCHARGE THE HIGH-VOLTAGE CAPACITOR BEFORE SERVICING.

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Whenever troubleshooting is performed the power supply must be disconnected. It may, in some cases, be necessary to connect the power supply after the outer case has been removed, in this event:

1. Disconnect the power supply cord, and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.
4. Disconnect the leads to the primary of the power transformer.
5. Ensure that the leads remain isolated from other components and oven chassis by using insulation tape.
6. After that procedure, reconnect the power supply cord.

When the testing is completed,

1. Disconnect the power supply cord, and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.
4. Reconnect the leads to the primary of the power transformer.
5. Reinstall the outer case (cabinet).
6. Reconnect the power supply cord after the outer case is installed.
7. Run the oven and check all functions.

After repairing

1. Reconnect all leads removed from components during testing.
2. Reinstall the outer case (cabinet).
3. Reconnect the power supply cord after the outer case is installed.
4. Run the oven and check all functions.

Microwave ovens should not be operated empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the power to HIGH and set the microwave timer for two (2) minutes. When the two minutes has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out **Before Servicing** procedure and re-examine the connections to the component being tested.

When all service work is completed and the oven is fully assembled, the microwave power output should be checked and a microwave leakage test should be carried out.

MICROWAVE MEASUREMENT PROCEDURE

A. Requirements:

1) Microwave leakage limit (Power density limit): The power density of microwave radiation emitted by a microwave oven should not exceed 1mW/cm^2 at any point 5cm or more from the external surface of the oven, measured prior to acquisition by a purchaser, and thereafter (through the useful life of the oven), 5 mW/cm^2 at any point 5cm or more from the external surface of the oven.
2) Safety interlock switches:
   Primary interlock relay switch shall prevent microwave radiation emission in excess of the requirement as above mentioned. Secondary interlock relay and door sensing switch shall prevent microwave radiation emission in excess of 5 mW/cm2 at any point 5cm or more from the external surface of the oven.

B. Preparation for testing:
Before beginning the actual measurement of leakage, proceed as follows:
1) Make sure that the actual instrument is operating normally as specified in its instruction booklet.

Important:
Survey instruments that comply with the requirement for instrumentation as prescribed by the performance standard for microwave ovens, 21 CFR 1030.10(c)(3)(i), must be used for testing.

2) Place the oven tray in the oven cavity.
3) Place the load of 275±15 ml (9.8 oz) of tap water initially at 20±5^{O}C (68^{O}F) in the center of the oven cavity.
   The water container shall be a low form of 600 ml (20 oz) beaker with an inside diameter of approx. 8.5 cm (3-1/2 in.) and made of an electrically nonconductive material such as glass or plastic.
   The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4) Set the cooking control on Full Power Cooking Mode.
5) Close the door and select a cook cycle of several minutes. If the water begins to boil before the survey is completed, replace it with 275 ml of cool water.

C. Leakage test:

Closed-door leakage test (microwave measurement):
1) Grasp the probe of the survey instrument and hold it perpendicular to the gap between the door and the body of the oven.
2) Move the probe slowly, not faster than 1 in./sec. (2.5 cm/sec.) along the gap, watching for the maximum indication on the meter.
3) Check for leakage at the door screen, sheet metal seams and other accessible positions where the continuity of the metal has been breached (eg., around the switches, indicator, and vents).
   While testing for leakage around the door, pull the door away from the front of the oven as far as is permitted by the closed latch assembly.
4) Measure carefully at the point of highest leakage and make sure that the highest leakage is no greater than 4mW/cm^2, and that the primary interlock switch/secondary interlock relay does turn the oven OFF before any door movement.

NOTE: After servicing, record data on service invoice and microwave leakage report.

SERVICE MANUAL

SHARP

MICROWAVE OVEN

R-509FW

FOREWORD

This Manual has been prepared to provide Sharp Electronics Corp. Service Personnel with Operation and Service Information for the SHARP MICROWAVE OVEN, R-509FW.

It is recommended that service personnel carefully study the entire text of this manual so that they will be qualified to render satisfactory customer service.

Check the interlock switches and the door seal carefully. Special attention should be given to avoid electrical shock and microwave radiation hazard.

WARNING

Never operate the oven until the following points are ensured:
(A) The door is tightly closed.
(B) The door brackets and hinges are not defective.
(C) The door packing is not damaged.
(D) The door is not deformed or warped.
(E) There is no other visible damage with the oven.

Servicing and repair work must be carried out only by trained service personnel.

DANGER

Certain initial parts are intentionally not grounded and present a risk of electrical shock only during servicing. Service personnel - Do not contact the following parts while the appliance is energized;
High Voltage Capacitor, Power Transformer, Magnetron, High Voltage Rectifier Assembly, High Voltage Harness;
If provided, Vent Hood, Fan assembly, Cooling Fan Motor.

All the parts marked "*" on parts list are used at voltages more than 250V.

Removal of the outer wrap gives access to voltage above 250V.

All the parts marked "Δ" on parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

PRODUCT DESCRIPTION
GENERAL INFORMATION
OPERATION
TROUBLESHOOTING GUIDE AND TEST PROCEDURE
TOUCH CONTROL PANEL
WIRING DIAGRAM
PARTS LIST

SHARP ELECTRONICS CORPORATION

SHARP PLAZA, MAHWAH,
NEW JERSEY 07430-2135

SPECIFICATION

ITEM	DESCRIPTION
PowerRequirements	120 Volts 13.3 Amperes, 1600 watts 60 Hertz Single phase, 3 wire grounded
Power Output	1100 watts (IEC 705 TEST PROCEDURE) Operating frequency of 2450MHz
Case Dimensions	Width 24" Height 13-3/8" Depth 19-1/8"
Cooking Cavity Dimensions 1.8 Cubic Feet	Width 17-3/8" Height 10-1/2" Depth 18-5/8"
Control Complement	Touch Control System Clock (1:00 - 12:59) Timer (0 - 99 min. 99 seconds) Microwave Power for Variable Cooking Repetition Rate; P-HI ..... Full power throughout the cooking time P-90 ..... approx. 90% of Full Power P-80 ..... approx. 80% of Full Power P-70 ..... approx. 70% of Full Power P-60 ..... approx. 60% of Full Power P-50 ..... approx. 50% of Full Power P-40 ..... approx. 40% of Full Power P-30 ..... approx. 30% of Full Power P-20 ..... approx. 20% of Full Power P-10 ..... approx. 10% of Full Power P-0 ..... No power throughout the cooking time MINUTE PLUS pad, Cook pads, Defrost center pads, Reheat pads, Number selection pads, Power Level pad, Timer/Clock pad,Stop/Clear pad, START pad, and Popcorn. Yes
Safety Standard	UL Listed FCC Authorized Complies with DHHS Rules, CFR, Title 21, Chapter 1, Subchapter J

GENERAL INFORMATION

GROUNDING INSTRUCTIONS

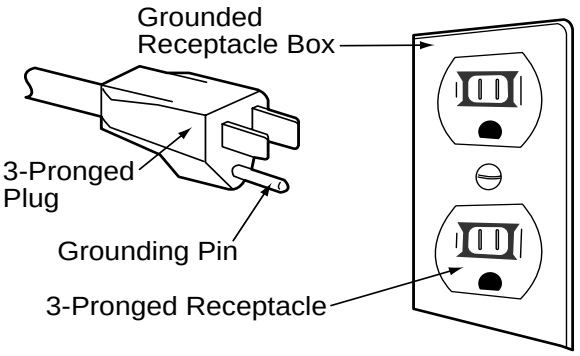
This oven is equipped with a three prong grounding plug. It must be plugged into a wall receptacle that is properly installed and grounded in accordance with the National Electrical Code and local codes and ordinances.
In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current.

WARNING: Improper use of the grounding plug can result in a risk of electric shock.

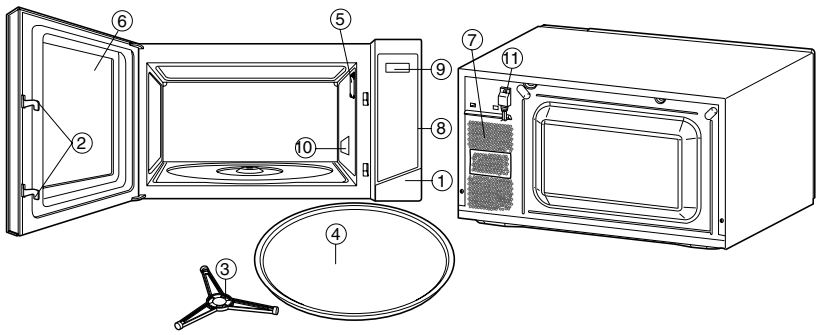
Electrical Requirements
The electrical requirements are a 120 volt 60 Hz, AC only,
15 or 20 amp. fused electrical supply. It is recommended that a separate circuit serving only this appliance be provided. When installing this appliance, observe all applicable codes and ordinances.
A short power-supply cord is provided to reduce risks of becoming entangled in or tripping over a longer cord.
Where a two-pronged wall-receptacle is encountered, it is the personal responsibility and obligation of the customer to contact

a qualified electrician and have it replaced with a properly grounded three-pronged wall receptacle or have a grounding adapter properly grounded and polarized. If the extension cord must be used, it should be a 3-wire, 15 amp. or higher rated cord. Do not drape over a countertop or table where it can be pulled on by children or tripped over accidentally.

CAUTION: DO NOT UNDER ANY CIRCUMSTANCES CUT OR REMOVE THE ROUND GROUNDING PRONG FROM THIS PLUG.

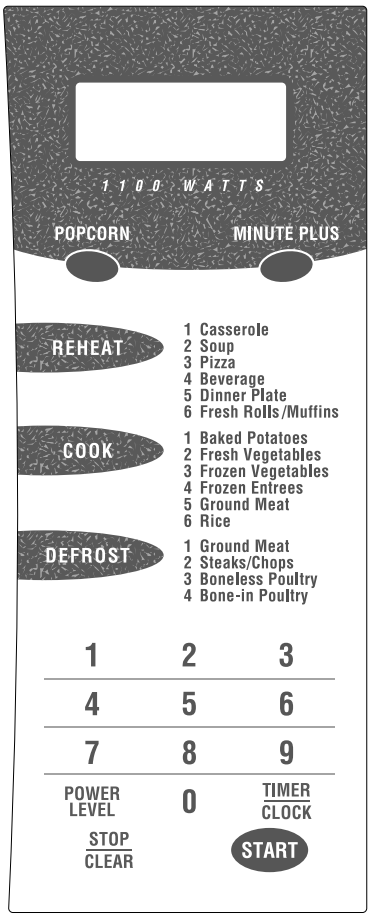


OVEN DIAGRAM



1. One touch door open button.
   Push to open door.
2. Door latches.
   The oven will not operate unless the door is securely closed.
3. Removable turntable support.
4. Removable turntable.
   The turntable will rotate clockwise or counterclockwise.
5. Oven lamp.
   It will light when oven is operating or door is opened.
6. Oven door with see-through window.
7. Ventilation openings. (Rear)
8. Auto-Touch control panel.
9. Time display: Digital display, 99 minutes 99 seconds.
10. Wave guide cover.
11. Power supply cord

TOUCH CONTROL PANEL



R-509FW

NOTE:
The directed features are disabled after one minute when the oven is not in use. These features are automatically enabled when the door is opened and closed or the STOP/ CLEAR pad is pressed.

OPERATION

DESCRIPTION OF OPERATING SEQUENCE

The following is a description of component functions during oven operation.

OFF CONDITION

Closing the door activates the door sensing switch and primary interlock switch. (In this condition, the monitor switch contacts are opened.)
When oven is plugged in, 120 volts A.C. is supplied to the control unit. (Figure O-1).

1. The display will show flashing "88 : 88".
   To set any program or set the clock, you must first touch the STOP/CLEAR pad. The display will clear, and " : " will appear.

COOKING CONDITION

Program desired cooking time by touching the NUMBER pads. Program the power level by touching the POWER LEVEL pad and then a Number pad.
When the START pad is touched, the following operations occur:

1. The contacts of relays are closed and components connected to the relays are turned on as follows.
   (For details, refer to Figure O-2)

RELAY	CONNECTED COMPONENTS
RY-1	oven lamp/turntable motor/fan motor
RY-2	power transformer

2. 120 volts A.C. is supplied to the primary winding of the power transformer and is converted to about 3.3 volts A.C. output on the filament winding, and approximately 2370 volts A.C. on the high voltage winding.
3. The filament winding voltage heats the magnetron filament and the H.V. winding voltage is sent to a voltage doubler circuit.
4. The microwave energy produced by the magnetron is channelled through the waveguide into the cavity feed-box, and then into the cavity where the food is placed to be cooked.
5. Upon completion of the cooking time, the power transformer, oven lamp, etc. are turned off, and the generation of microwave energy is stopped. The oven will revert to the OFF condition.
6. When the door is opened during a cook cycle, the monitor switch, door sensing switch, primary interlock switch, relay (RY1) and secondary interlock relay are activated with the following results. The circuits to the turntable motor, the cooling fan motor, and the high voltage components are de-energized, the oven lamp remains on, and the digital read-out displays the time still remaining in the cook cycle when the door was opened.
7. The monitor switch electrically monitors the operation of the primary interlock switch and secondary interlock relay and is mechanically associated with the door so that it will function in the following sequence.

(1) When the door opens from the closed position, the secondary interlock relay (RY2) and primary interlock switch open their contacts. And contacts of the relay (RY1) remains closed. Then the monitor switch contacts close.
(2) When the door is closed from the open position, the monitor switch contacts open first. Then the contacts of the primary interlock switch and door sensing switch close. And contacts of the relay (RY1) open.

If the primary interlock switch and secondary interlock relay (RY2) fail with the contacts closed when the door is opened, the closing of the monitor switch contacts will form a short circuit through the C/T fuse, primary interlock switch, relay (RY1) and secondary interlock relay (RY2), causing the C/T fuse to blow.

POWER LEVEL P-0 TO P-90 COOKING

When Variable Cooking Power is programmed, the 120 volts A.C. is supplied to the power transformer intermittently through the contacts of relay (RY-2) which is operated by the control unit within a 32 second time base. Microwave power operation is as follows:

VARI-MODE	ON TIME	OFF TIME
Power 10(P-HI) (100% power)	32 sec.	0 sec.
Power 9(P-90) (approx. 90% power)	30 sec.	2 sec.
Power 8(P-80) (approx. 80% power)	26 sec.	6 sec.
Power 7(P-70) (approx. 70% power)	24 sec.	8 sec.
Power 6(P-60) (approx. 60% power)	22 sec.	10 sec.
Power 5(P-50) (approx. 50% power)	18 sec.	14 sec.
Power 4(P-40) (approx. 40% power)	16 sec.	16 sec.
Power 3(P-30) (approx. 30% power)	12 sec.	20 sec.
Power 2(P-20) (approx. 20% power)	8 sec.	24 sec.
Power 1(P-10) (approx. 10% power)	6 sec.	26 sec.
Power 0(P-0) (0% power)	0 sec.	32 sec.

Note: The ON/OFF time ratio does not correspond with the percentage of microwave power, because approx. 2 seconds are needed for heating of the magnetron filament.

SCHEMATIC

NOTE: CONDITION OF OVEN

1. Door Closed
2. CLOCK APPEARS ON DISPLAY

Note:* Indicates component

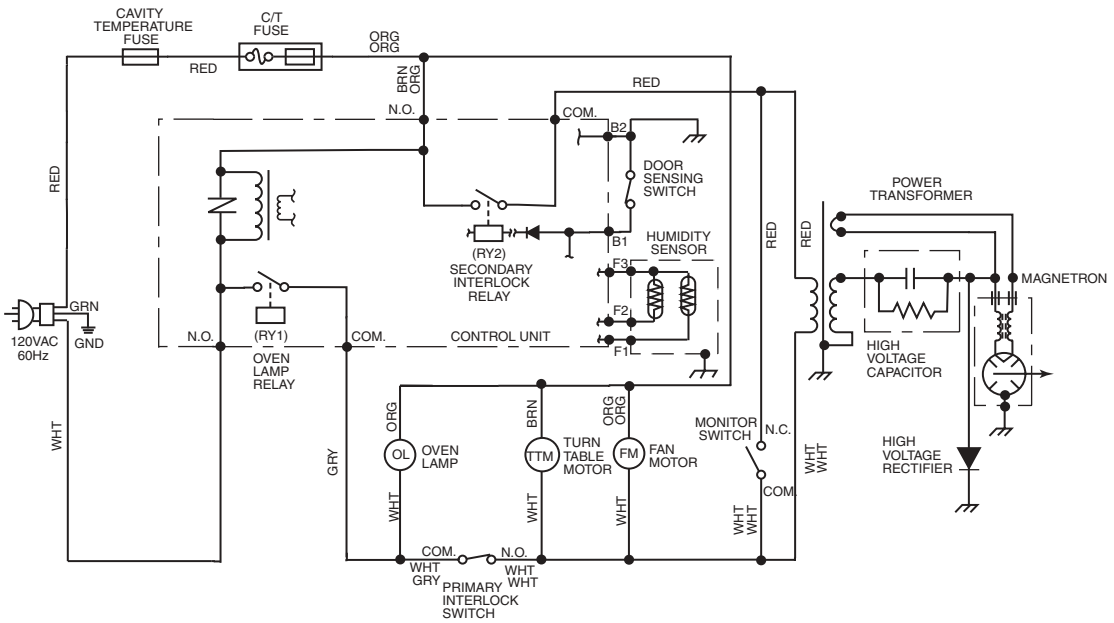


Figure O-1 Oven Schematic - Off Condition

SCHEMATIC

NOTE: CONDITION OF OVEN

1. DOOR CLOSED
2. COOKING TIME PROGRAMMED
3. VARIABLE COOKING CONTROL "HIGH"
4. "START" PAD TOUCHED

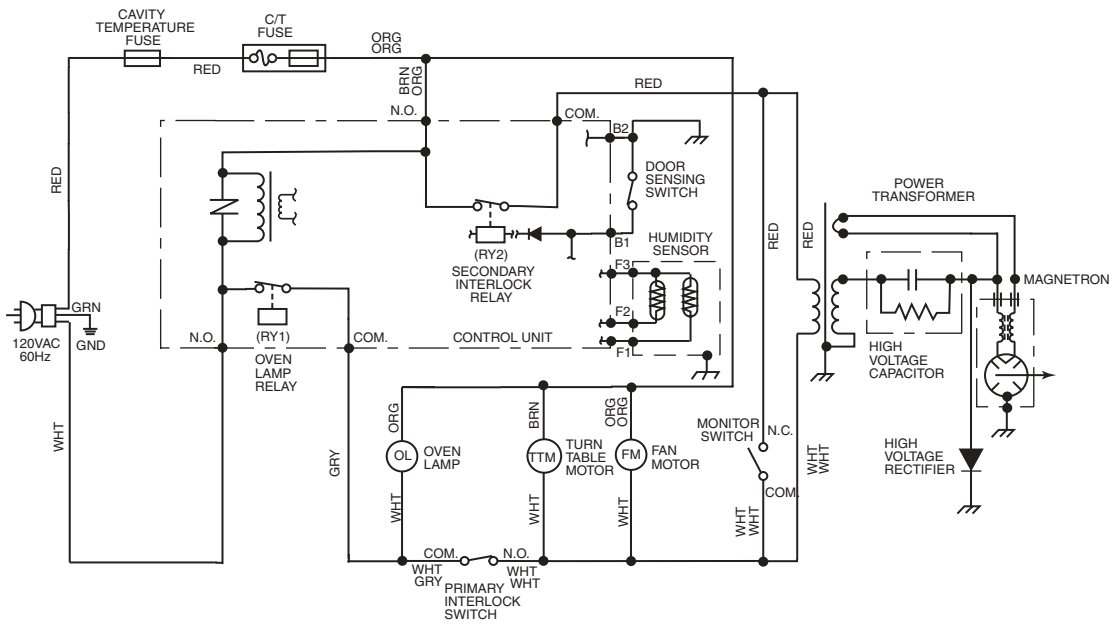


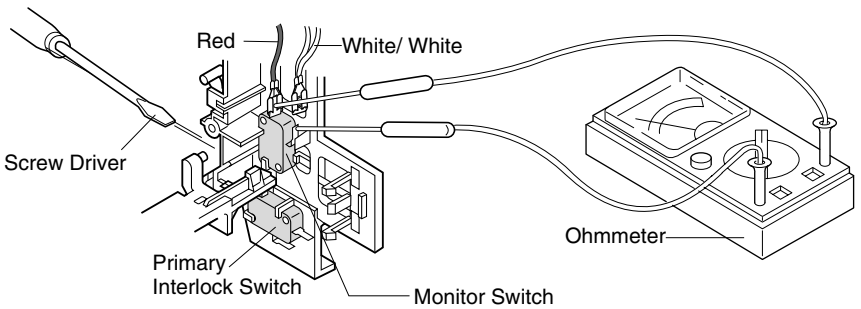
Figure O-2 Oven Schematic - Cooking Condition

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

G **MONITOR SWITCH TEST**

1. Disconnect the power supply cord, and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.
4. Before performing this test, make sure that the primary interlock switch and the secondary interlock relay are operating properly, according to the above Switch Test Procedure. Disconnect the wire lead from the monitor switch (COM) terminal. Check the monitor switch operation by using the ohmmeter as follows. When the door is open, the meter should indicate a closed circuit. When the monitor switch actuator is pushed by a screw driver through the lower latch hole on the front plate of the oven cavity with the door opened (in this condition the plunger of the monitor switch is pushed in), the meter should indicate an open circuit. If improper operation is indicated, the switch may be defective. After testing the monitor switch, reconnect the wire lead to the monitor switch (COM) terminal and check the continuity of the monitor circuit.
5. Reconnect all leads removed from components during testing.
6. Reinstall the outer case (cabinet).
7. Reconnect the power supply cord after the outer case is installed.
8. Run the oven and check all functions.



I **TOUCH CONTROL PANEL ASSEMBLY TEST**

The touch control panel consists of circuits including semiconductors such as LSI, ICs, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit, and also the Control Unit is divided into two units, LSI Unit and Power Unit, and troubleshooting by unit replacement is described according to the symptoms indicated.

Before testing,

1) Disconnect the power supply cord, and then remove outer case.
2) Open the door and block it open.
3) Discharge high voltage capacitor.
4) Disconnect the leads to the primary of the power transformer.
5) Ensure that these leads remain isolated from other components and oven chassis by using insulation tape.

1. Key Unit.

   NOTE :

   1) Check Key unit ribbon connection before replacement.
   2) Re-install the outer case (cabinet).
   3) Reconnect the power supply cord after the outer case is installed.
   4) Run the oven and check all functions.

   The following symptoms indicate a defective key unit.

   a) When touching the pads, a certain pad produces no signal at all.
   b) When touching a number pad, two figures or more are displayed.
   c) When touching the pads, sometimes a pad produces no signal.

   If the Key unit is defective.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

1) Disconnect the power supply cord, and then remove outer case.
2) Open the door and block it open.
3) Discharge high voltage capacitor.
4) Replace the Key unit.
5) Reconnect all leads removed from components during testing.
6) Re-install the outer case (cabinet).
7) Reconnect the power supply cord after the outer case is installed.
8) Run the oven and check all functions.

2. Control Unit

The following symptoms indicate a defective control unit. Before replacing the control unit, perform the Key unit test (Procedure J) to determine if control unit is faulty.

2-1 In connection with pads.
- a) When touching the pads, a certain group of pads do not produce a signal.
- b) When touching the pads, no pads produce a signal.

2-2 In connection with indicators
- a) At a certain digit, all or some segments do not light up.
- b) At a certain digit, brightness is low.
- c) Only one indicator does not light.
- d) The corresponding segments of all digits do not light up; or they continue to light up.
- e) Wrong figure appears.
- f) A certain group of indicators do not light up.
- g) The figure of all digits flicker.

2-3 Other possible problems caused by defective control unit.
- a) Buzzer does not sound or continues to sound.
- b) Clock does not operate properly.
- c) Cooking is not possible.

When testing is completed,

1) Disconnect the power supply cord, and then remove outer case.
2) Open the door and block it open.
3) Discharge high voltage capacitor.
4) Reconnect all leads removed from components during testing.
5) Re-install the outer case (cabinet).
6) Reconnect the power supply cord after the outer case is installed.
7) Run the oven and check all functions..

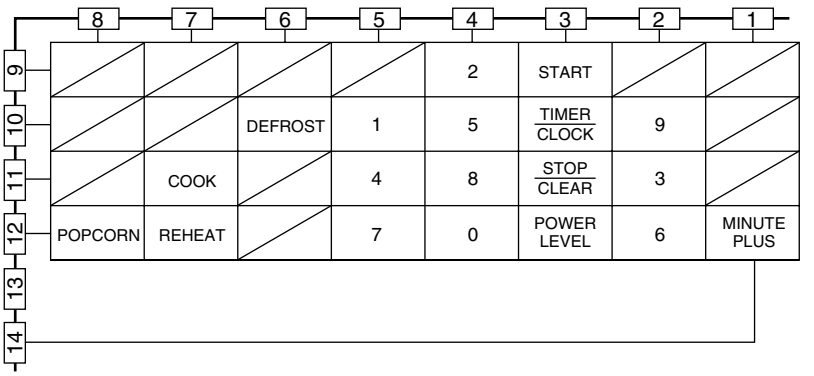
J **KEY UNIT TEST**

1. Disconnect the power supply cord, and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.
4. If the display fails to clear when the STOP/CLEAR pad is depressed, first verify the flat ribbon cable is making good contact, verify that the door sensing switch (stop switch) operates properly; that is the contacts are closed when the door is closed and open when the door is open. If the door sensing switch (stop switch) is good, disconnect the flat ribbon cable that connects the key unit to the control unit and make sure the door sensing switch is closed (either close the door or short the door sensing switch connecter). Use the Key unit matrix indicated on the control panel schematic and place a jumper wire between the pins that correspond to the STOP/CLEAR pad making momentary contact. If the control unit responds by clearing with a beep the key unit is faulty and must be replaced. If the control unit does not respond, it is faulty and must be replaced. If a specific pad does not respond, the above method may be used (after clearing the control unit) to determine if the control unit or key pad is at fault.
5. Reconnect all leads removed from components during testing.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

6. Re-install the outer case (cabinet).
7. Reconnect the power supply cord after the outer case is installed.
8. Run the oven and check all functions.



Key Unit

K **RELAY TEST**

1. Disconnect the power supply cord, and then remove outer case.
2. Open the door and block it open.
3. Discharge high voltage capacitor.
4. Disconnect the leads to the primary of the power transformer.
5. Ensure that these leads remain isolated from other components and oven chassis by using insulation tape.
6. After that procedure, re-connect the power supply cord.
7. Remove the outer case and check voltage between the normal open terminal of the relay RY1 and the normal open terminal of the relay RY2 on the control unit with an A.C. voltmeter.The meter should indicate 120 volts, if not check oven circuit.

RY1 and RY2 Relay Test

These relays are operated by D.C. voltage

Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.

DC. voltage indicated ..... Defective relay.

DC. voltage not indicated ..... Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	Approx. 12.0V D.C.	Oven lamp / Turntable motor / Cooling fan motor
RY2	Approx. 11.0V D.C.	Power transformer

8. Disconnect the power supply cord, and then remove outer case.
9. Open the door and block it open.
10. Discharge high voltage capacitor.
11. Reconnect all leads removed from components during testing.
12. Re-install the outer case (cabinet).
13. Reconnect the power supply cord after the outer case is installed.
14. Run the oven and check all functions.

L **DEFROST TEST**

WARNING : The oven should be fully assembled before following procedure.

(1) Place one cup of water in the center of the turntable tray in the oven cavity.

(2) Close the door, touch the " DEFROST " pad once.

(3) Touch the number pad " 2 " and then touch the number pad " 5 ".

(4) Touch the start pad.

WEIGHT	1ST STAGE		2ND STAGE	
0.5lb	LEVEL	TIME	LEVEL	TIME
	60%	57sec.	40%	22sec.

(5) The oven is in Defrost cooking condition.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

(6) The oven will operate as follows. (in case of Steak/Chops 0.5lb)
(7) If improper operation is indicated, the control unit is probably defective and should be checked.

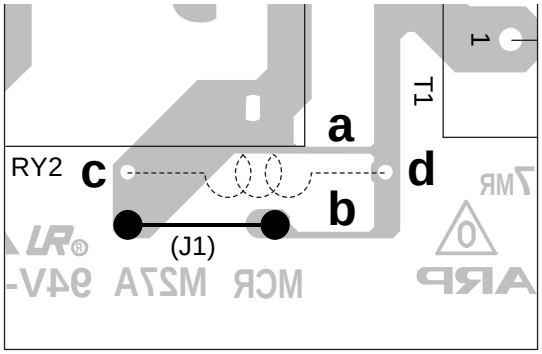
M **FOIL PATTERN ON THE PRINTED WIRING BOARD TEST**

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse.

1. Foil pattern check and repairs.
   1) Disconnect the power supply cord, and then remove outer case.
   2) Open the door and block it open.
   3) Discharge high voltage capacitor.
   4) Follow the troubleshooting guide given below for repair.

STEPS	OCCURRENCE	CAUSE OR CORRECTION
1	Only pattern at "a" is broken.	*Insert jumper wire J1 and solder.
2	Pattern at "a" and "b" are broken.	*Insert the coil RCILF2003YAZZ between "c" and "d".

   5) Make a visual inspection of the varistor. Check for burned damage and examine the transformer with a tester for the presence of layer short-circuit (check the primary coil resistance which is approximately 540 ohms ± 20%). If any abnormal condition is detected, replace the defective parts.



   6) Reconnect all leads removed from components during testing.
   7) Re-install the outer case (cabinet).
   8) Reconnect the power supply cord after the outer case is installed.
   9) Run the oven and check all functions.
2. Follow the troubleshooting guide given below, if indicator does not light up after above check and repairs are finished.
   1) Disconnect the power supply cord, and then remove outer case.
   2) Open the door and block it open.
   3) Discharge high voltage capacitor.
   4) Disconnect the leads to the primary of the power transformer.
   5) Ensure that these leads remain isolated from other components and oven chassis by using insulation tape.
   6) After that procedure, re-connect the power supply cord.
   7) Follow the troubleshooting guide given below for repair.

STEPS	OCCURRENCE	CAUSE OR CORRECTION
1	The rated AC voltage is not present between the normal open terminal of the relay RY1 and the normal open terminal of the relay RY2	Check supply voltage and oven power cord.
2	The rated AC voltage is present at primary side of low voltage transformer.	Low voltage transformer or secondary circuit defective. Check and repair.

   8) Disconnect the power supply cord, and then remove outer case.
   9) Open the door and block it open.
   10) Discharge high voltage capacitor.
   11) Reconnect all leads removed from components during testing.
   12) Re-install the outer case (cabinet).
   13) Reconnect the power supply cord after the outer case is installed.
   14) Run the oven and check all functions.

TOUCH CONTROL PANEL ASSEMBLY

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units.

(1) Key Unit
(2) Control Unit (The Control Unit consists of Power Unit and LSI Unit).

The principal functions of these units and the signals communicated among them are explained below.

Key Unit
The key unit is composed of a matrix, signals generated in the LSI are sent to the key unit through P20, P21, P22, P23, P24, P25, P26 and P27.
When a key pad is touched, a signal is completed through the key unit and passed back to the LSI through P41, P45, P47, P70 and AN2 to perform the function that was requested.

Control Unit
Control unit consists of LSI, reset circuit, indicator circuit, power source circuit, relay circuit, buzzer circuit, synchronizing signal circuit and back light circuit.

1) Reset Circuit
This circuit generates a signal which resets the LSI to the initial state when power is supplied.

2) Indicator Circuit
This circuit consists of 22 segments and 3 common electrodes using a Liquid Crystal Display.

3) Power Source Circuit
This circuit generates voltages necessary in the control unit from the AC line voltage.
In addition, the synchronizing signal is available in order to compose a basic standard time in the clock circuit.

Symbol	Voltage	Application
VC	-5V	LSI(IC1)

4) Relay Circuit
A circuit to drive the magnetron, fan motor, turntable motor and light the oven lamp.

5) Buzzer Circuit
The buzzer is responsive to signals from the LSI to emit audible sounds (key touch sound and completion sound).

6) Synchronizing Signal Circuit
The power source synchronizing signal is available in order to compose a basic standard time in the clock circuit.
It accompanies a very small error because it works on commercial frequency.

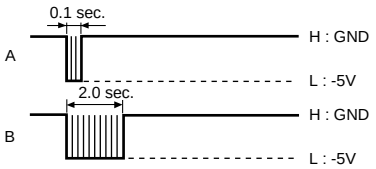
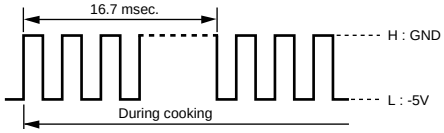
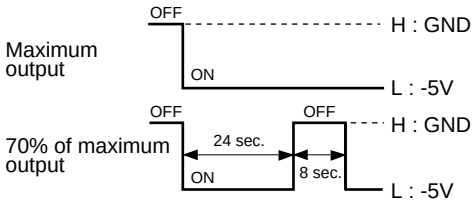
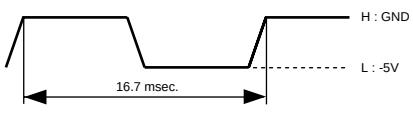
7) Door Sensing Switch
A switch to “tell” the LSI if the door is open or closed.

8) Back Light Circuit
A circuit to drive the back light (Light emitting diodes LD1- LD4).

DESCRIPTION OF LSI

LSI

The I/O signal of the LSI is detailed in the following table.

Pin No.	Signal	I/O	Description
1-2	VL2-VL1	IN	**Power source voltage input terminal.** Standard voltage for LCD.
3-6	AN7-AN4	IN	**Terminal to change cooking input according to the Model.** By using the A/D converter contained in the LSI, DC voltage in accordance with the Model in operation is applied to set up its cooking constant.
7	P63	OUT	Terminal not used.
8	AN2	IN	**Input terminal to judge the model.** Connected to GND through the pull-down resistor.
9	AN1	IN	**To input signal which communicates the door open/close information to LSI.** Door close "H" level signal (0V). Door open "L" level signal (-5V).
10	AN0	IN	**Input terminal to judge the model.** The one of signals P20 - P27 will be input into AN0 through one of G1 - G8 lines on key matrix.The LSI will judge the model by this signal.
11	P57	OUT	Back light circuit (Light emitting diodes) driving signal.
12-13	P56-P55	OUT	Terminal not used.
14	CNTR0	OUT	**Signal to sound buzzer (2.0 kHz).** A: key touch sound. B: Completion sound. 
15	P53	OUT	**Oven lamp, fan motor and turntable motor driving signal** To turn on and off shut off relay (RY1). The square waveform voltage is delivered to the RY1 driving circuit and RY2 control circuit. 
16	P52	OUT	**Magnetron high-voltage circuit driving signal.** To turn on and off the cook relay (RY2). The signals holds "L" level during microwave cooking and "H" level while not cooking. In other cooking modes (variable cooking) the signal turns to "H" level and "L" level in repetition according to the power level. 
17-18	P51-P50	OUT	Terminal not used.
19	P47	IN	**Signal coming from touch key.** When either G12 line on key matrix is touched, a corresponding signal out of P20 - P27 will be input into P47. When no key is touched, the signal is held at "H" level.
20	P46	OUT	Terminal not used.
21	P45	IN	**Signal similar to P47.** When either G11 line on key matrix is touched, a corresponding signal will be input into P45.
22-23	P44-P43	IN	Terminal not used.
24	INT0	IN	**Signal synchronized with commercial power source frequency.** This is the basic timing for time processing of LSI. 
25	P41	IN	**Signal similar to P47.** When either G10 line on key matrix is touched, a corresponding signal will be input into P41.
26	P40	IN	Connected to GND through the pull-down resistor R90.

Pin No.	Signal	I/O	Description
27	$\overline{\text{RESET}}$	IN	**Auto clear terminal.** Signal is input to reset the LSI to the initial state when power is applied. Temporarily set "L" level the moment power is applied, at this time the LSI is reset. Thereafter set at "H" level.
28	P71	OUT	Terminal not used.
29	P70	IN	**Signal similar to P47.** When either G9 line on key matrix is touched, a corresponding signal will be input into P70.
30	XIN	IN	**Internal clock oscillation frequency input setting.** The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.
31	XOUT	OUT	**Internal clock oscillation frequency control output.** Output to control oscillation input of XIN.
32	VSS	IN	**Power source voltage: -5.0V.** VC voltage of power source circuit input.
33	P27	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G8 line keys on key matrix is touched.
34	P26	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G7 line keys on key matrix is touched.
35	P25	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G6 line keys on key matrix is touched.
36	P24	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G5 line keys on key matrix is touched.
37	P23	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G4 line keys on key matrix is touched.
38	P22	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G3 line keys on key matrix is touched.
39	P21	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P41, P45, P47 and P70 terminal while one of G2 line keys on key matrix is touched.
40	P20	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to AN0, P41, P45, P47 and P70 terminal while one of G1 line keys on key matrix is touched.
41-48	P17-P10	OUT	Terminal not used.
49-50	P07-P06	OUT	Terminal not used.
51-72	SEG21-SEG0	OUT	**Segment data signal.** Connected to LCD. The relation between signals are as follows: LSI signal (Pin No.) ····· LCD segment / LSI signal (Pin No.) ····· LCD segment SEG 21 (51) ····· SEG 22 / SEG 10 (62) ····· SEG 11 SEG 20 (52) ····· SEG 21 / SEG 9 (63) ····· SEG 10 SEG 19 (53) ····· SEG 20 / SEG 8 (64) ····· SEG 9 SEG 18 (54) ····· SEG 19 / SEG 7 (65) ····· SEG 8 SEG 17 (55) ····· SEG 18 / SEG 6 (66) ····· SEG 7 SEG 16 (56) ····· SEG 17 / SEG 5 (67) ····· SEG 6 SEG 15 (57) ····· SEG 16 / SEG 4 (68) ····· SEG 5 SEG 14 (58) ····· SEG 15 / SEG 3 (69) ····· SEG 4 SEG 13 (59) ····· SEG 14 / SEG 2 (70) ····· SEG 3 SEG 12 (60) ····· SEG 13 / SEG 1 (71) ····· SEG 2 SEG 11 (61) ····· SEG 12 / SEG 0 (72) ····· SEG 1

Pin No.	Signal	I/O	Description
73/74	VCC/VREF	IN	Connected to GND.
75	AVSS	IN	Connected to VC.
76	COM3	OUT	Terminal not used.
77	COM2	OUT	**Common data signal.** Connected to LCD signal COM3.
78	COM1	OUT	**Common data signal.** Connected to LCD signal COM2.
79	COM0	OUT	**Common data signal.** Connected to LCD signal COM1.
80	VL3	IN	**Power source voltage input terminal.** Standard voltage for LCD.

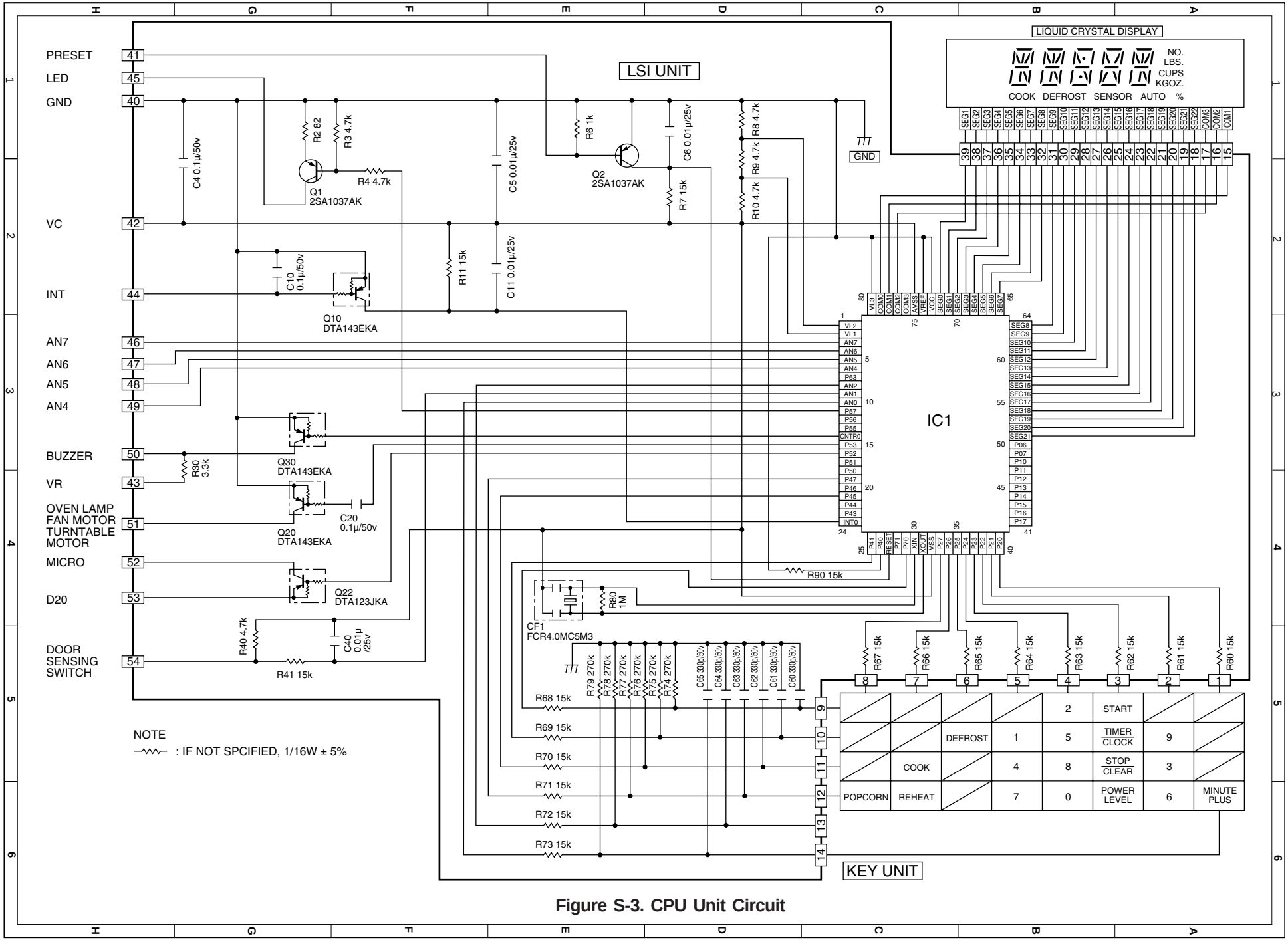


Figure S-3. CPU Unit Circuit

PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V. "§" MARK: PARTS DELIVERY SECTION.

REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
			ELECTRIC PARTS		
1- 1	RC-QZB018MRE0	M	High voltage capacitor	1	AQ
1- 2	FH-DZB013MRY0	M	High voltage rectifier assembly	1	AK
1- 3	QSOCLB006MRE0	M	Oven lamp socket	1	AE
1- 4	RLMPTA068WRE0	M	Oven lamp	1	AE
1- 5	RMOTEA346WRE0	M	Fan motor	1	AR
1- 6	FFS-BA019/KIT	M	Monitor switch (V-16G-2C25), C/T fuse (20A 250V AC) & Inst.	1	AF
1- 7	QSW-MA085WRE0	M	Primary interlock switch and door sensing switch (V-5230Q)	2	AE
1- 8	QFS-TA050WRZZ	M	C/T fuse 150°C	1	AE
1- 9	QFS-TA014WRE0	M	Cavity temperature fuse 150°C	1	AF
Δ 1-10	RV-MZA293WRE0	M	Magnetron	1	BC
1-11	RMOTDA211WRE0	M	Turntable motor	1	AL
1-12	RTRN-B065MRE0	M	Power transformer	1	BD
1-13	FACCDB003MRE0	M	Power supply cord	1	AM
			CABINET PARTS		
2- 1	GDAI-B061MRP0	M	Base plate	1	AS
2- 2	GLEGPB004MRF0	M	Foot	4	AB
2- 3	GCABUB089MRP0	M	Outer case cabinet	1	AW
			CONTROL PANEL PARTS		
3- 1	CPWBFB063MRU0	M	Control unit	1	BA
3- 1A	QCNCMA275DRE0	J	2-pin connector (CN-B)	1	AB
3- 1B	FW-VZB194MRE0	M	Lead wire harness (WH-1)	1	AG
C1	RC-KZA087DRE0	J	Capacitor 0.1 uF 50V	1	AA
C2	VCEA0A1EW108M	M	Capacitor 1000 uF 25V	1	AB
C3	VCEA0A1AW227M	M	Capacitor 220 uF 10V	1	-
C21	VCEAB31VW106M	J	Capacitor 10 uF 35V	1	AA
D1-4	RH-DZA006PRE0	J	Diode (1N4002)	4	AD
D20-22	VHD1SS270A/-1	J	Diode (1SS270A)	3	AA
D40	VHD1SS270A/-1	J	Diode (1SS270A)	1	AA
LD1-4	RH-PXA002DRZZ	M	Light emitting diode	4	-
Q21	VSKRC243M//-3	J	Transistor (KRC243M)	1	AB
R1	VRD-B12HF561J	J	Resistor 560 ohm 1/2W	1	AA
RY1-2	RRLY-A114DRE0	J	Relay (DU12D1-1PR(M))	2	AN
SP1	RALM-A019DRZZ	M	Buzzer	1	-
T1	RTRNPA110DRE0	J	Transformer	1	AP
VRS1	RH-VZA032DRE0	J	Varistor (10G471K)	1	AE
ZD1	VHEHZ4C3///-1	J	Zener diode (HZ4C3)	1	AA
3- 2	FPNLCB404/KIT	M	Control panel sub assembly	1	AY
3- 2-1	FUNTKB349/KIT	M	Key unit	1	AN
3- 2-2	JBTN-B121MRF0	M	Open button	1	AF
3- 2-3	MSPRTA050WRE0	M	Open button spring	1	AA
3- 3	PSHEPA798WREZ	M	LCD sheet	1	AG
3- 4	QCNC-B001MRE0	M	Rubber connector	1	AD
3- 5	RLCDSA107DRZZ	M	Light crystal display	1	AG
3- 6	XEPSD30P10XS0	M	Screw; 3mm x 10mm	3	AB
			OVEN PARTS		
4- 1	LBNDKB007MRP0	M	H.V. Capacitor band	1	AB
4- 2	LANGTB059MRP0	M	Chassis support	1	AG
4- 3	PHOK-B018MRF0	M	Latch hook	1	AF
4- 4	MLEVPB016MRF0	M	Switch lever	1	AD
4- 5	PDUC-B120MRF0A	M	Magnetron duct	1	AM
4- 6	NFANPB006MRE0	M	Fan blade	1	AC
4- 7	PDUC-B088MRF0	M	Fan duct	1	AC
4- 8	----------	M	Oven cavity (Not a replaceable part)	1	--
4- 9	PCOVPB085MRP0	M	Waveguide cover	1	AH
4-10	PPACGB014MRF0	M	Turntable motor packing	1	AA
4-11	PCUSGB037MRP0	M	Cushion	1	AB
4-12	PCUSU0464MRE0	M	Cushion	1	AC

REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
			DOOR PARTS		
5 -1	FCOV-B205MRK0	M	Door frame assembly	1	AQ
5 -2	LSTPPB021MRF0	M	Latch head	1	AD
5 -3	MSPRTA046WRE0	M	Latch spring	1	AB
5 -4	FDORFB049MRT0	M	Door panel	1	AX
5- 5	PSHEPB016MRE0	M	Sealer film	1	AD
5- 6	HPNL-B090MRE0	M	Door screen	1	AM
5- 7	GCOVHB039MRF0	M	Choke cover	1	AG
			MISCELLANEOUS		
6- 1	FW-VZB125MRE0	M	Stop switch harness	1	AU
6- 2	FW-VZB192MRE0	M	Main wire harnes	1	AU
6- 3	TLABBB007MRE0	M	Cavity hole cover	1	AA
6- 4	FROLPB025MRK0	M	Turntable support	1	AN
6- 5	NTNT-A099WRE0	M	Turntable tray	1	AT
6- 6	TCAUAB045MRR0	M	Monitor caution label	1	AA
6- 7	TCAUAB038MRR0	M	DHHS/Screw caution label	1	AB
6- 8	TINSEB306MRK0	M	Operation manual	1	AD
6- 9	QW-QZB016MRE0	M	High voltage wire A	1	AC
			SCREWS,NUTS AND WASHERS		
7- 1	LX-BZA041WRE0	M	Special screw	5	AA
7- 2	LX-CZ0052WRE0	M	Special screw	2	AA
7- 3	XHTSD40P12RV0	M	Screw : 4mm x 12mm	1	AA
7- 4	XOTSD40P12000	M	Screw : 4mm x 12mm	8	AA
7- 5	XCBSD30P08000	M	Screw : 3mm x 8mm	3	AA
7- 6	LX-CZA038WRE0	M	Special screw	2	AA
7- 7	XHTSD40P08RV0	M	Screw : 4mm x 8mm	3	AA
7- 8	LX-CZA070WRE0	M	Special screw (Torx tamper proof screw)	2	AB
7- 9	XOTSE40P12000	M	Special screw (Outer case)	4	AA

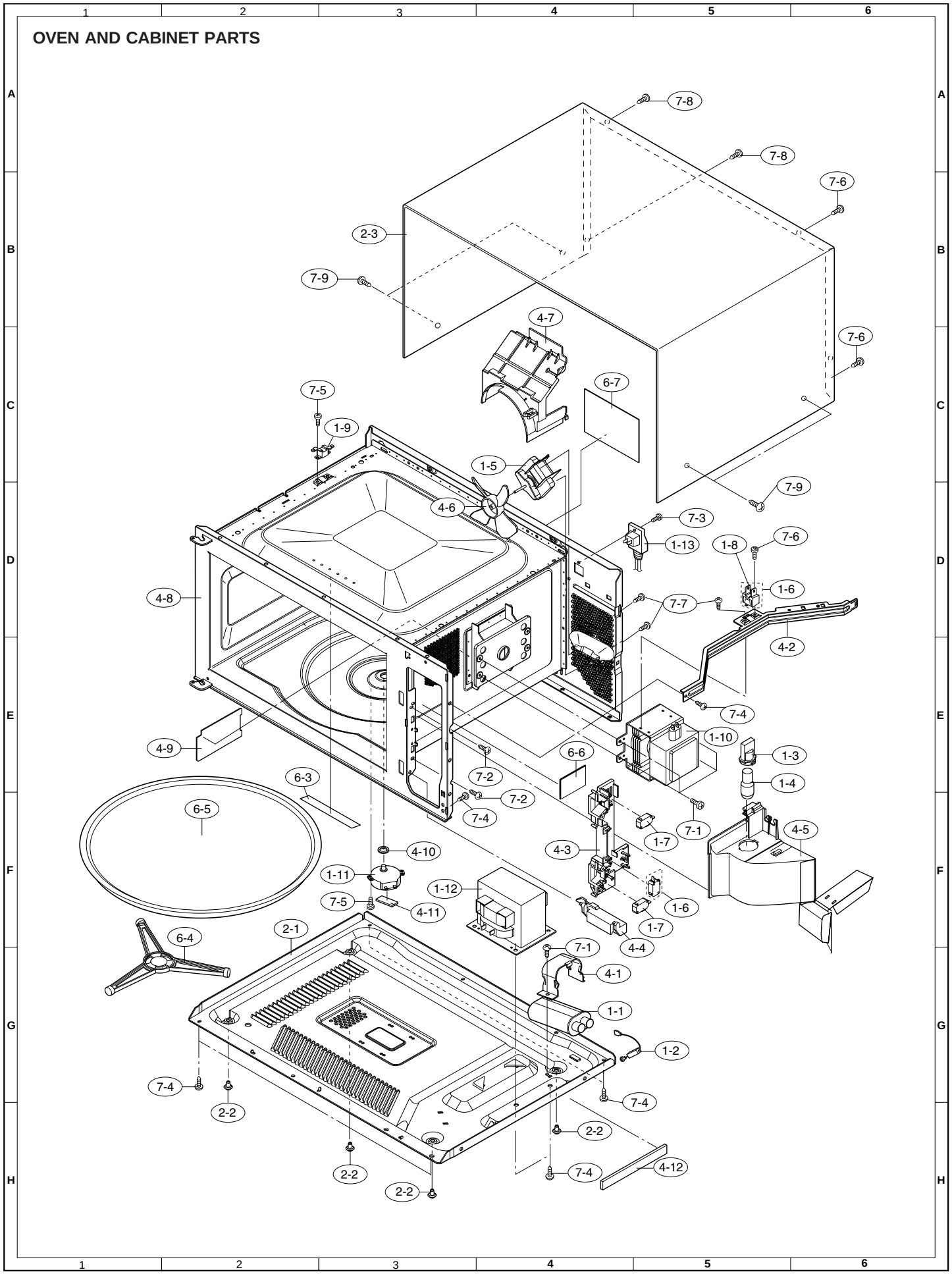
HOW TO ORDER REPLACEMENT PARTS

To have your order filled promptly and correctly, please furnish the following information.

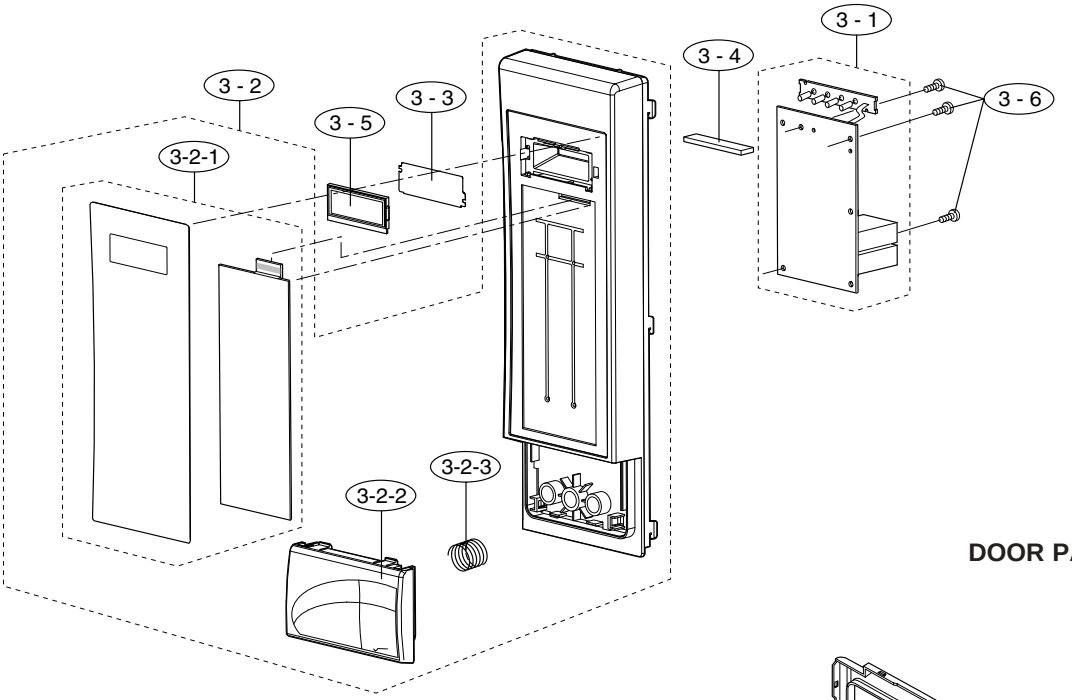
1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

Order Parts from the authorized SHARP parts Distributor for your area.
Defective parts requiring return should be returned as indicated in the Service Policy.

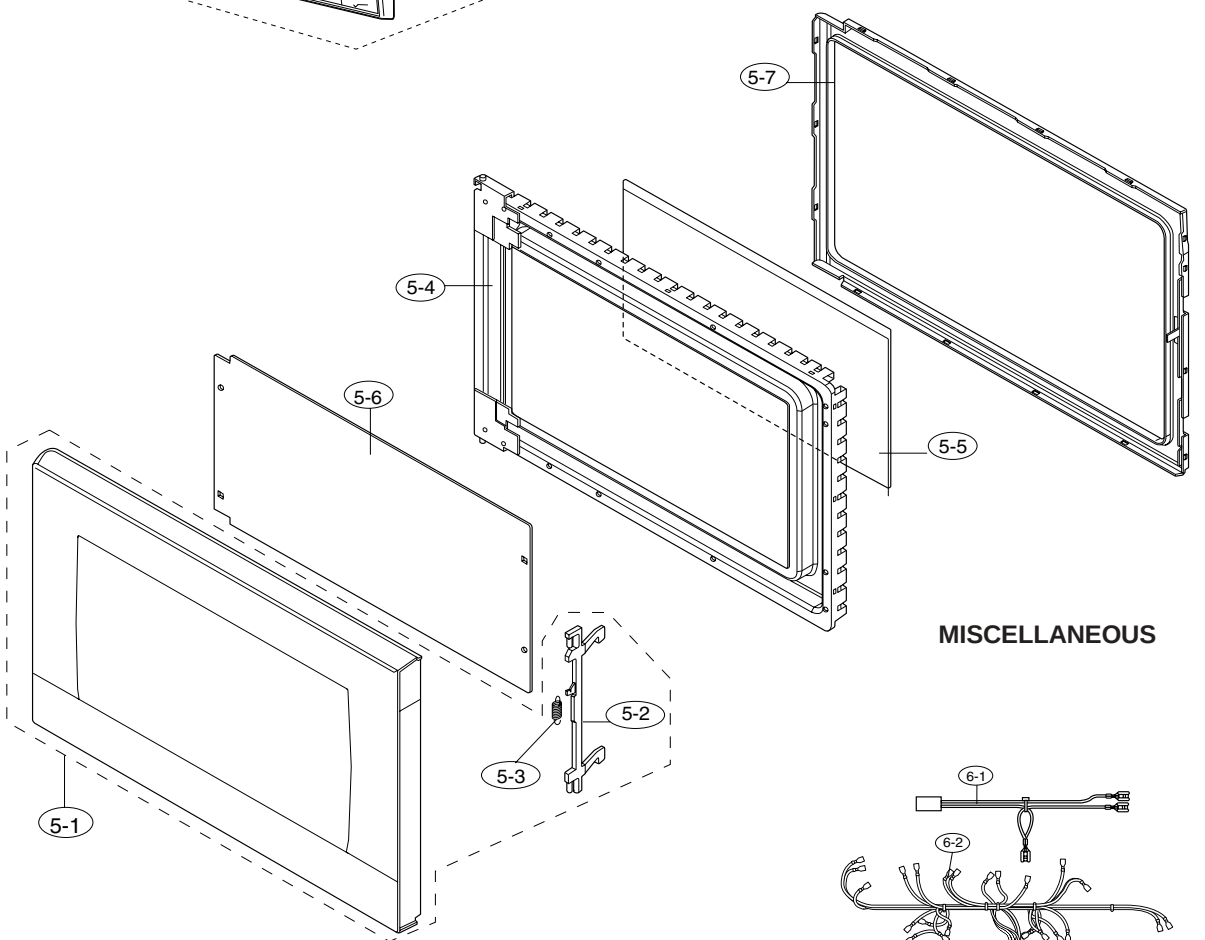
OVEN AND CABINET PARTS



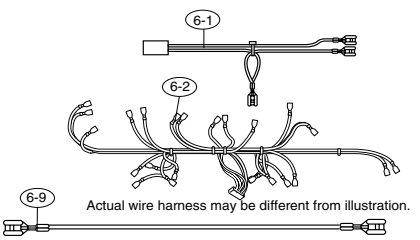
CONTROL PANEL PARTS



DOOR PARTS

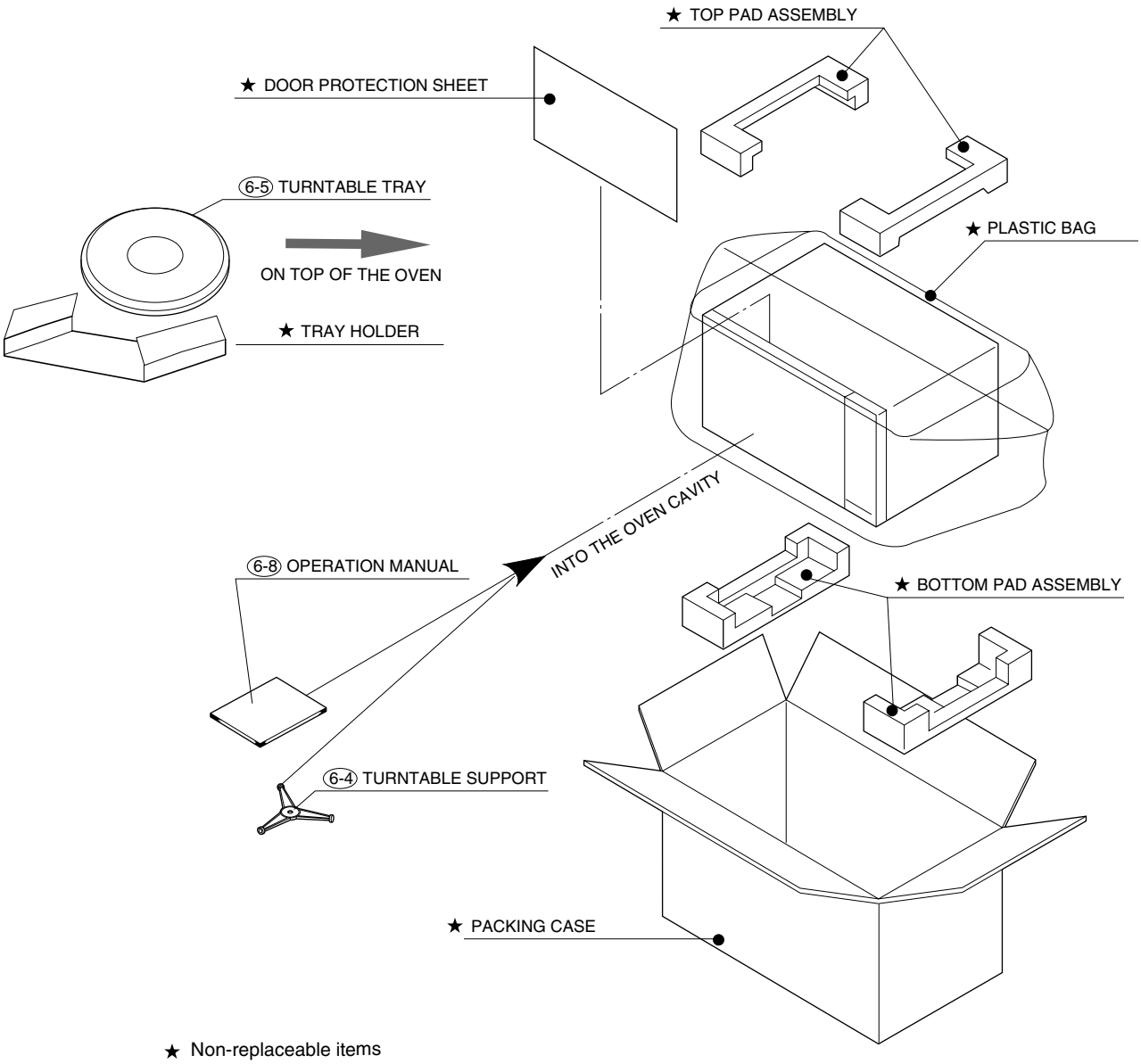


MISCELLANEOUS



Actual wire harness may be different from illustration.

PACKING AND ACCESSORIES



★ Non-replaceable items

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